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Anusha J. Pai Asnodkar

NASA Space Technology Graduate Researcher

Exoplanet atmospheres ◇ Instrumentation
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Education

The Ohio State University — Columbus, Ohio

June 2025 **Anticipate Ph.D. in Astronomy**
Thesis Advisor: Prof. Ji Wang

Nov 2021 **M.S. in Astronomy**

California Institute of Technology — Pasadena, California

June 2019 **B.S. in Physics, Division of Physics, Math, and Astronomy**

Research

Optical testbed for a dual-aperture fiber nuller (GSpec) **08/21 — Present**
The Ohio State University, Department of Astronomy *Prof. Ji Wang*
Developing an optical test bench of a dual-aperture fiber nuller design concept for applications in high-dispersion coronagraphy and atmospheric characterization of substellar systems.
Skills/Software: Optics, Python

Atmospheric dynamics of ultra-hot Jupiters **08/19 — Present**
The Ohio State University, Department of Astronomy *Prof. Ji Wang*
Applying high-resolution transmission spectroscopy of ultra-hot Jupiters to detect atomic/ionized species as tracers of atmospheric dynamics. See Publications.
Skills/Software: Python, MCMC, Gaussian Processes

Detector calibration and numerical modeling of critical phenomena **06/18—06/19**
Jet Propulsion Laboratory, Division 382J *Dr. Inseob Hahn*
Combined skills in optics and programming to extract CMOS image sensor pixel response functions by laser interferometry. Implemented crossover parametric model of critical phenomena as a secondary project.
Skills/Software: Optics, electronics, Python, MATLAB, Mathematica, numerical methods

Design and construction of an extended cavity diode laser for spin initialization in rare-earth quantum memories **06/17—08/17**
California Institute of Technology, APhMS Department *Prof. Andrei Faraon*
Constructed and characterized a tunable extended cavity diode laser customized to applications in quantum memories based on Ytterbium-doped crystals. Tested for thermal, structural, and spectral robustness.
Skills/Software: Optics, electronics, MATLAB, Mathematica

Characterizing the oblateness of the Milky Way's Outer Halo **06/16—08/16**
California Institute of Technology, PMA Department *Prof. Judy Cohen*
Synthesized population models of the Milky Way's Outer Halo to quantify its oblateness. Implemented ML-based Lomb-Scargle periodograms of RR Lyrae light curves.
Skills/Software: Python, time-series analysis

Complex networks and NoCs intern at teuscher.:Lab **06/13—06/15**
Portland State University, ECE Department *Prof. Christof Teuscher*
Developed an iterative model for developing networks-on-chip (NoCs) incorporating traffic throughput as a metric in the design process.
Skills/Software: MATLAB

Apprenticeship in Science and Engineering **06/12—09/12**
Portland State University, ECE Department *Prof. Christof Teuscher*
Applied neural network analysis techniques (community and motif detection) to correlate structural aspects of complex NoCs with cost-efficiency. Refer to co-authored publication.
Skills/Software: MATLAB

Publications

Lead-Author Publications *(reverse chronological order)*

1. **Variable and super-sonic winds in the atmosphere of an ultra-hot giant planet**
Pai Asnodkar, A., Wang, J., Eastman, J., Cauley, P., Gaudi, B., Ilyin, I., and Strassmeier, K. (2022). *AJ, 163(4), 155.*

2. **KELT-9 as an eclipsing double-lined spectroscopic binary: a unique and self-consistent solution to the system**
Pai Asnodkar, A., Wang, J., Gaudi, B., Cauley, P., Eastman, J., Ilyin, I., Strassmeier, K., and Beatty, T. (2022). *AJ, 163(2), 40.*

Contributing Author Publications *(reverse chronological order)*

1. **A Reanalysis of the Composition of K2-106b: an Ultra-short Period Super-Mercury Candidate**
Rodríguez Martínez, R., Gaudi, B., Schulze, J., Acuña, L., Kolecki, J., Johnson, J., ***Pai Asnodkar, A.***, Boley, K., Deleuil, M., Mousis, O., Panero, W., and Wang, J. (2022). AJ, 165(3), 97.

2. **Is LTT 1445 Ab a Hycean World or a cold Haber World? Exploring the Potential of Twinkle to Unveil Its Nature.**
Phillips, C., Wang, J., Edwards, B., Rodríguez Martínez, R., ***Pai Asnodkar, A.***, and Gaudi, B. (2022). arXiv e-prints, arXiv:2209.12919.

3. **The PEPSI-LBT Exoplanet Transit Survey (PETS). II. A Deep Search for Thermal Inversion Agents in KELT-20 b/MASCARA-2 b with Emission and Transmission Spectroscopy.**
Johnson, M. C., Wang, J., ***Pai Asnodkar, A.***, Bonomo, A., et al. (2022). *AJ, submitted (arXiv: 2205.12162)*

4. **Retrieving the C and O Abundances of HR 7672 AB: A Solar-type Primary Star with a Benchmark Brown Dwarf.**
Wang, J., Kolecki, J., Ruffio, J.B., Wang, J., Mawet, D., Baker, A., Bartos, R., Blake, G., Bond, C., Calvin, B., Cetre, S., Delorme, J.R., Doppmann, G., Echeverri, D., Finnerty, L., Fitzgerald, M., Jovanovic, N., Liu, M., Lopez, R., Morris, E., ***Pai Asnodkar, A.***, Pezzato, J., Ragland, S., Roy, A., Ruane, G., Sappey, B., Schofield, T., Skemer, A., Venenciano, T., Kent Wallace, J., Wallack, N., Wizinowich, P., and Xuan, J. (2022). *AJ, 163(4), 189.*

5. **A Structural Analysis of Evolved Complex Networks-on-Chip**
Chung, H., ***Pai Asnodkar, A.***, and Teuscher, C. (2012). In Proceedings of the Fifth International Workshop on Network on Chip Architectures (NoCArc '12). ACM, New York, NY, USA, 17-22. http://doi.acm.org/10.1145/2401716.2401721

Awards and Honors

NASA Space Technology Graduate Researcher (2022)
Recipient of NSTGRO fellowship for "Dual-Aperture Fiber Nulling For High Spatial and Spectral Resolution Studies of Exoplanets".

2021 Edward F. Hayes Research Forum (The Ohio State University)
Selected to present an oral presentation and awarded honorable mention in the category of Mathematical and Physical Sciences.

The David G. Price Fund-Research Associateship in Astronomical Instrumentation
Received fellowship twice from 2020-2022.

Oral Presentations

WASP-12 b's enigmatic atmospheric dynamics
Great Lakes Exoplanet Area Meeting (GLEAM), The Ohio State University, November 2022

Variable atmospheric dynamics of planets experiencing gravity-darkened seasons
Thinkshop 2022: High-resolution spectroscopy for exoplanet atmospheres and biomarkers, Virtual, September 2022

Variable and Super-sonic Winds in the Atmosphere of an Ultra-hot Jupiter
IAU Symposium 370 "Winds of Stars and Exoplanets", e-talk, August 2022.

Variable and Super-sonic Winds in the Atmosphere of an Ultra-hot Jupiter
Bay Area Exoplanet Meeting, Virtual, March 2022

Measuring Rapid Global-scale Winds on KELT-9 b
Emerging Researchers in Exoplanet Science (ERES) Conference, Virtual, May 2021

Global-scale Winds and Dynamical Mass of the Ultra-hot Jupiter KELT-9 b
Invited, NASA Jet Propulsion Laboratory Exoplanet Journal Club, Virtual, May 2021

Caltech SFP SURF Seminar Day
Caltech, 2016-2018

Poster Presentations

Observational constraints on the atmospheric dynamics of the inspiraling ultra-hot Jupiter WASP-12 b
Exoplanets IV, Penn State, August 2022

Variable and Super-sonic Winds in the Atmosphere of an Ultra-hot Jupiter
Exoplanets IV, Las Vegas, May 2022

Workshops and Summer Schools

AstroTech Summer School
University of California, Berkeley, July 2021

Penn State Astrostatistics Summer School
Virtual, June 2021

Erdős Institute Data Science Boot Camp
Virtual, May 2020
Final group project selected within top 5.

High-Resolution Infrared Spectroscopy for Exoplanet Characterization Hackathon
Caltech, February 2020

2018 Southern California Conference for Undergraduate Women in Physics (CUWiP)
Harvey Mudd College, Pomona College, and Cal Poly Pomona, January 2018

ZTF Summer School 2016
Caltech, June 2016

Broader Activities and Mentorship

The Ohio State University Polaris Program **08/20 —Present**
Providing academic counseling and semester-long research project mentorship for undergraduates.

OSU Undergraduate Research Summer Access (URSA) Program **2021 & 2022**
Organizer and instructor for a 2-week long summer early arrival program aimed at incoming OSU freshman in physics and astronomy.

OSU Astronomy Department Python Bootcamp **2022**
One of several instructors for a Python bootcamp aimed towards incoming graduate and undergraduate students.

SciAccess Zenith Mentorship Program **09/20 —12/20**
Provided college guidance and citizen science project mentorship for blind and visually-impaired high school students interested in space sciences.

Outreach Presentations

Friends of Ohio State Astronomy and Astrophysics **10/22**
Co-presented "Exoplanets and the Search for Life with JWST" to a public audience at The Ohio State University.

The Ohio State University Astronomical Society **11/20**
Presented in-prep. work on atmospheric dynamics of KELT-9 b.

Columbus Astronomical Society **04/20**
Co-presented a historical overview of women in astronomy with cohort.

Technical Strengths

Operating systems	Linux/Unix, Windows
Languages	Python, MATLAB, Mathematica, R, HTML, CSS
Astronomy Software	`numpy/scipy/astropy, emcee, george, Spectroscopy Made Easy (SME), petitRADTRANS, p-winds`
Miscellaneous	Optics, LaTeX, GitHub